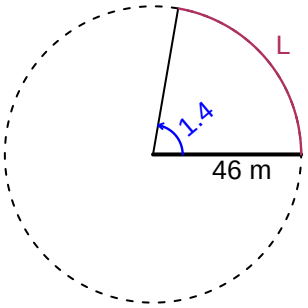
Name: Date:

Trig Final (SLTN v621)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 1.4 radians. The radius is 46 meters. How long is the arc in meters?

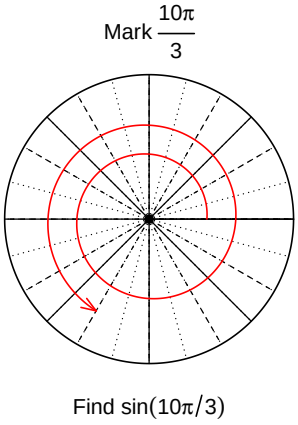


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

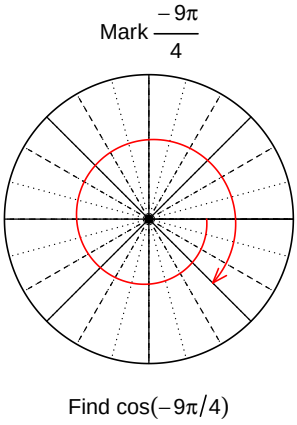
$L = 64.4$ meters.

Question 2

Consider angles $\frac{10\pi}{3}$ and $\frac{-9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{10\pi}{3}\right)$ and $\cos\left(\frac{-9\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(10\pi/3)$



Find $\cos(-9\pi/4)$

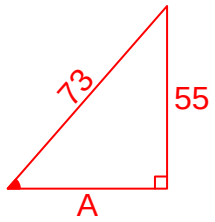
$\sin(10\pi/3) = \frac{-\sqrt{3}}{2}$

$\cos(-9\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\sin(\theta) = \frac{55}{73}$, and θ is in quadrant II, determine an exact value for $\tan(\theta)$.

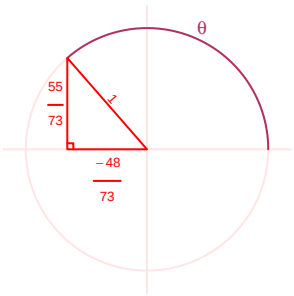
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$A^2 + 55^2 = 73^2$$
$$A = \sqrt{73^2 - 55^2}$$
$$A = 48$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\tan(\theta) = \frac{\frac{55}{73}}{\frac{-48}{73}} = \frac{-55}{48}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 7.19 meters, a midline at $y = 8.5$ meters, and a frequency of 4.9 Hz. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 7.19\sin(2\pi 4.9t) + 8.5$$

or

$$y = 7.19\sin(9.8\pi t) + 8.5$$

or

$$y = 7.19\sin(30.79t) + 8.5$$